Sense Making and Perseverance

- **Learning goal**: *Explore strategies teachers can use to encourage students to make sense of problems and persevere in solving them*
- **Intended audience**: Secondary pst/ist
- **Connections to CCSS-M:Mathematical Practice:** *Making sense of problems and persevere in solving them*
- **Materials needed:** powerpoint/chart paper/ two textbook lessons/video
- **Resources used:** http://www.insidemathematics.org/index.php/standard-1

Description of Professional Learning Task

- The task requires the class to watch a video of high school geometry students exploring the quadrilaterals created by different combinations of diagonals. The PST's will be assigned to groups to observe different aspects of the "*Making Sense of Problems and Persevere in Solving Them*" practice throughout the 9.21 minute video.

- After the video, they will discuss in their groups what they observed with supporting details from the video and summarize their work on chart paper.

- Each group will share their findings with the whole class.

- Whole class discussions will then focus on strategies teachers can use to promote the practice.

Launch

Mathematical Practice #1

Making Sense of Problems and Persevere in Solving Them

Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution.

They analyze givens, constraints, relationships, and goals.

They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt.

They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution.

They monitor and evaluate their progress and change course if necessary.

Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need.

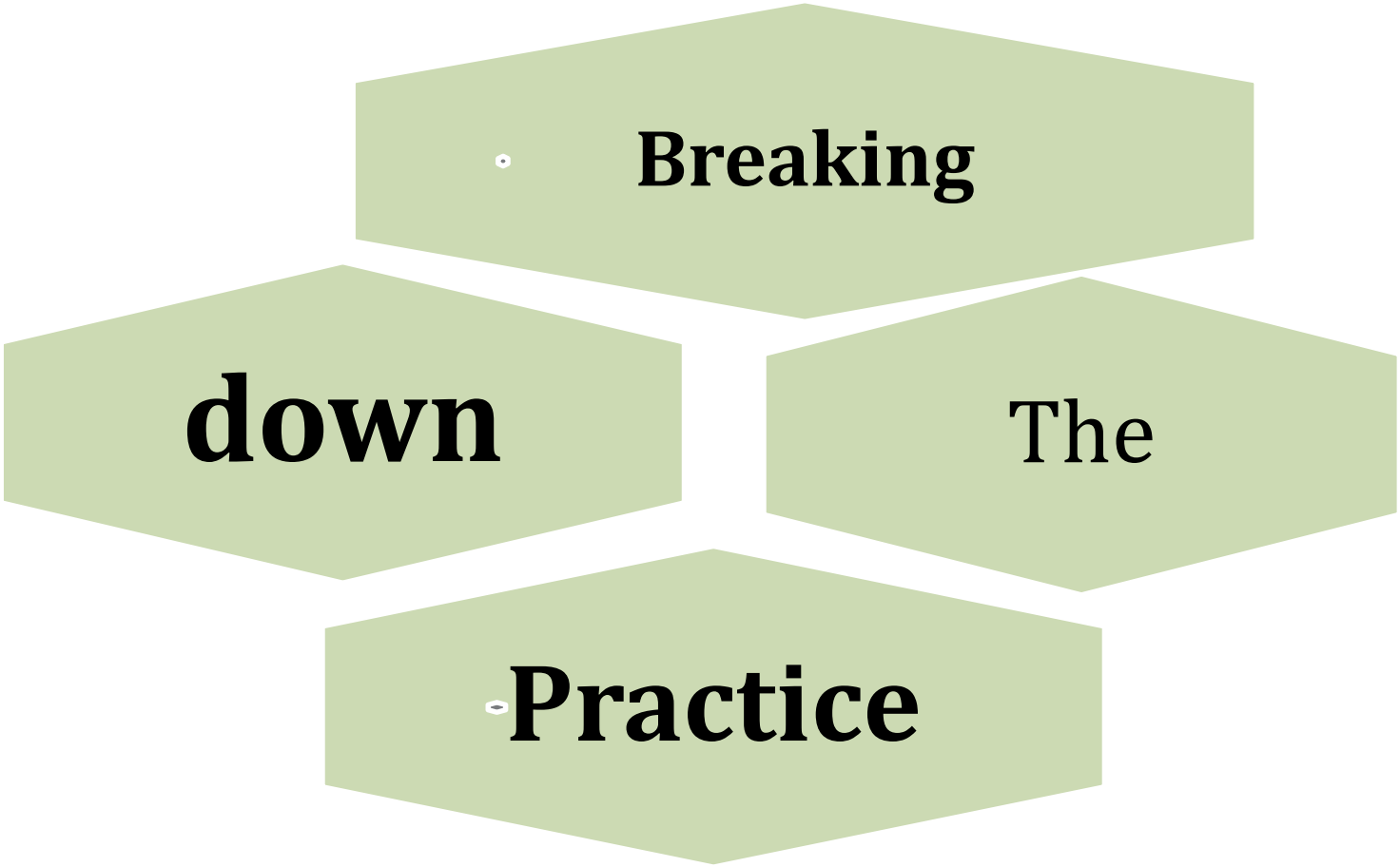
Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends.

Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem.

Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, “Does this make sense?”

They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.

Make sense of problems and persevere in solving them



Let's explore what this practice might look like in a secondary mathematics classroom.

Properties of Quadrilaterals

- Watch the second 9th/10th grade video under the Heading Making Sense of Problems and Persevere in Solving Them.
- http://insidemathematics.org/index.php/classroom-video-visits/public-lessons-properties-of-quadrilaterals/300-properties-of-quadrilaterals-tuesday-group-work-part-a

- You will be divided into one of three groups. Each group will look for a particular aspect of the mathematical practice. In your notebooks, describe how the high school students make sense of the problem they are working on in their groups.

- Share your findings with your group and combine your examples on the chart paper.

- Each group will share their examples with the whole class.

Group 1

Mathematically proficient students *start by explaining to themselves the meaning of a problem and looking for entry points to its solution.*

Group 2

Mathematically proficient students *analyze givens, constraints, relationships, and goals.*

Group 3

Mathematically proficient students *make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt*

Conclusion/Debriefing

Debrief the task by having pst's identify ways teachers can promote the three aspects of the mathematical practice.

Make of list of their responses.

PST's should leave with a list of ideas as to how they can promote the practice in their teaching.

Evidence of Teacher Learning

The pst's will be divided into two groups and assigned a high school lesson from a textbook.

They will identify specific strategies teachers may consider to promote the different aspects of the mathematical practice while teaching the lesson.

These strategies will be collected at the next class session and discussed in a whole group session.

Exploring how teachers might promote this practice

Component of the Mathematical Practice	Textbook Lesson #1	Textbook Lesson #2
Mathematically proficient students *start by explaining to themselves the meaning of a problem and looking for entry points to its solution.*		
Mathematically proficient students *analyze givens, constraints, relationships, and goals.*		
Mathematically proficient students *make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt*		

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